

# SHARP

Image Sensor Cameras

Controller IV-S51M  
LCD monitor IV-08MP

Image processing for various inspections and measurements can be easily made with user-friendly touch screen operated with finger or stylus pen.



## VISUAL STATION

Next-generation image sensor camera  
“VISUAL STATION”



ISO 9001  
certification  
JQA-1385

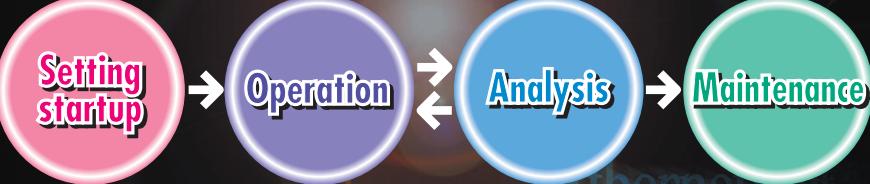


Sharp Manufacturing Systems Co., Ltd.  
Our headquarters has received  
ISO14001 certification  
(environmental management system).



# VISUAL STATION is the next-generation image sensor camera that pursues usability, visibility, and comprehensibility.

Complete range of functions from equipment selection to maintenance



Only Sharp can offer you complete range of functions starting with equipment selection.

Inspections and measurements using an image sensor camera used to require a lot of experience and time of an operator to select equipment and set up the system. Now, Sharp's VISUAL STATION, the next generation image sensor camera, can integrate all the experiences and know-how of image processing experts into one unit. It offers the complete range of functions of image processing including operation and maintenance.

Especially, new functions to support start set-up that used to take up man hours and labor are also integrated in this system. By simply following the displayed instruction and directly entering parameters in touch screen with a finger or a stylus pen, even a beginner can set up the camera easily and quickly. VISUAL STATION eliminates the deviation among individual operators in terms of the inspection/measurement results, and contributes to standardization and stabilization of inspection/measurement results, reduction of man hours and shortening of time.



# VISUAL STATION

Next-generation image sensor camera  
“VISUAL STATION”

You can directly enter your parameters in touch screen.  
Screen view shows operation procedure at a glance.

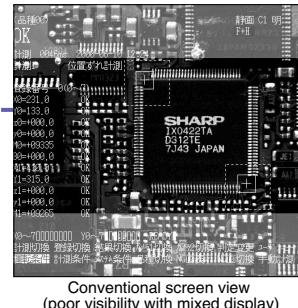
## Easy pen-touch entry and new menu system

Industry's first

VISUAL STATION offers you easy LCD touch screen operation. By simply following the displayed instruction, even a beginner can set up the camera easily and quickly. Newly employed menu system can realize operability and handiness better than ever.

### It used to be...

- Troublesome and time consuming to enter the parameters and set-up items by moving cursor with set-up key pad,
- Difficult for a beginner or a less-experienced operator to know how and what to set up, and
- Hard to see the screen with the inspection screen view and the menu overlapped.



Conventional screen view  
(poor visibility with mixed display)

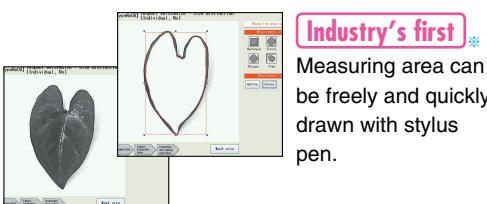
### With our VISUAL STATION...

- Even a beginner can start the operation without any difficulty by simply following this flow system.

Easy-to-see screen view with a split display screen for inspection and menu

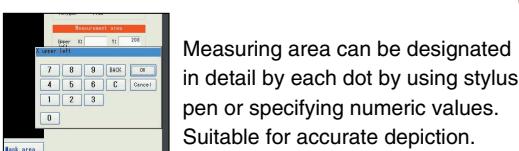


- Realized free-shape drawing in the measuring area.



Industry's first

Measuring area can be freely and quickly drawn with stylus pen.

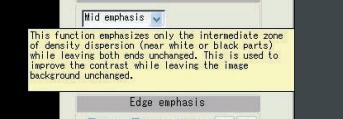


Measuring area can be designated in detail by each dot by using stylus pen or specifying numeric values. Suitable for accurate depiction.

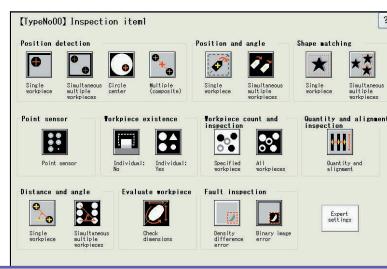
You can see what to start with, end with and what to set up at a glance.

\* Essential items to set up will be highlighted in orange.

- Help function can quickly give you the definition of unknown word on the screen.



- New menu system helps you select from inspection purpose.



You can select the appropriate menu without having image processing expertise.

This is suitable for...

- Existence of work and size inspection
- Inspection for missing dot of LCD, existence of debris
- Inspection for existence for flash of molded item
- Inspection for existence of connector pin
- The number of projected parts and the width, interval, etc. of the alignment
- IC lead width inspection
- Inspection for intervals, number, and diameter of BGA solder ball
- Shape degree of match inspection
- Shape of ball bearing/gear
- Inclination/misalignment of labels and seals
- Workpiece counting
- Workpiece counting of confection before wrapping
- Inspection for missing capsule/tablet

**Extraction of appropriate binary processed image requires no experience or technical knowledge of user.**

## Image processing procedure automatic generating expert

Industry's first<sup>®</sup>  
(patent pending)

VISUAL STATION is equipped with Image processing procedure automatic generating expert developed based on the know-how of image processing experts, and the analysis and collection of academic data. By simply entering the parameters according to the instruction on the screen and draw round the inspecting area with stylus pen, processing procedure will be automatically generated and executed. Image will be quickly extracted. Reducing the personal difference and shortening the time, this system improved efficiency and uniformity of the work.

**It used to be...**

- Difficult for a less-experienced operator to know what kind of image processing should be conducted in what procedures in order to obtain an appropriate inspection image,
- Difficult to stabilize the quality since there were some deviations when setting up image processing parameters among individual operators, and
- Uncertain and time consuming to set up correct parameters for image processing.

With our VISUAL STATION...

● Drawing around the inspecting area and entering inspection purpose and parameters will automatically generate appropriate image processing procedure and execute binary processing.

Draw around the area you wish to inspect and enter the parameters according to the instruction on the screen.

The identified inspecting area can be automatically extracted.

Automatically correct distortion of image. (Patent pending)

### Camera inclination and lens distortion automatic correction function

**It used to be...**

- Difficult to conduct stable image detection when the camera was inclined and created distortion in the image, and
- Difficult to eliminate the errors caused by the lens distortion depending on the inspected position.

With our VISUAL STATION...

● Automatically correct measurement error caused by inspected position resulted from image distortion.



Place the separately-sold reference plate for distortion correction under the camera, and enter the correct scale distance, then execute.

Correct focus position will be informed for clearer image.  
**Informing function of optimum focus**

**It used to be...**

- Relying on the individual operator's sense to focus, not knowing whether it was the optimum focus.

With our VISUAL STATION...

● Optimum focus can be confirmed from bar display.



Turn the focus adjuster to the point at which the bar display shows the maximum value.

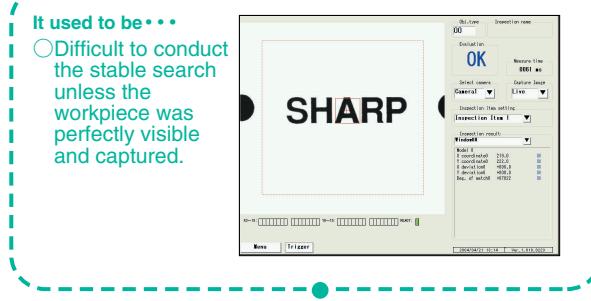
**High-quality IV assets are inherited, and S search and lighting control are newly added.**

## High basic performances together with various maintenance functions

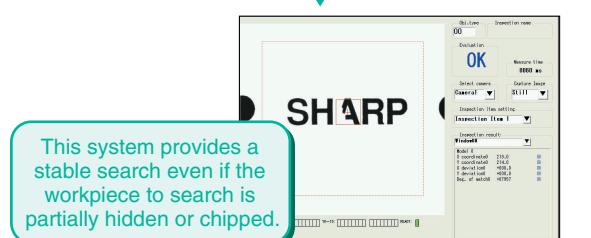
### New algorism (S search) reinforces search function.

New algorism reinforces the functions of conventional gray search (correlation for normalization). This system provides a stable search even if the workpiece you wish to search is partially hidden or chipped.

(Patent pending)



With our VISUAL STATION...

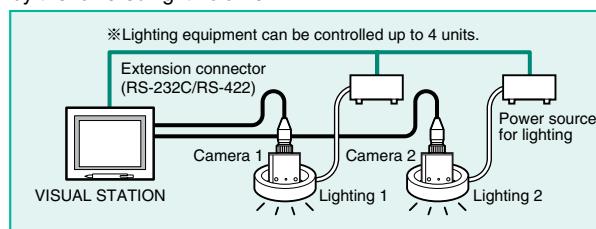


### Light level of the image is kept consistent by light level automatic adjustment function.

During the operation, the light volume on the workpiece used to be inconsistent due to the changes of surrounding environment. Inconsistency of the light volume could change the image's light level, and hinder the stable inspection/measurement results. VISUAL STATION uses light level automatic adjustment system with illuminance monitoring function that provides the stable screen image with the consistent light level.

### Reliable maintenance with lighting control

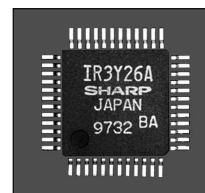
VISUAL STATION is equipped with lighting control function. When lighting power source for lighting control is used, general-purpose serial interface can control ON/OFF of the lighting, diagnose the light volume, and remotely control the lighting volume. This function allows you to prevent from improper detection caused by the lowered light volume.



●Contact our sales representative for the recommended lighting power source.

### High speed camera and partial image capture function greatly reduce the inspection time.

VISUAL STATION can work with double-speed/quadruple-speed cameras with progressive system CCD. Partial image capture function speed up the image-capturing. And further reduction of time can be possible by selecting from 4 modes to suite your inspection/measurement purpose.



#### Whole image/full mode

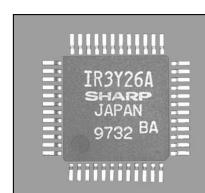
Whole screen is captured by full line

IV-S51M + Standard camera

33.3ms

IV-S51M + High-speed camera

16.7 ms

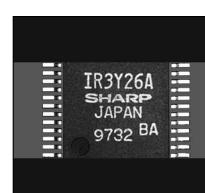


#### Whole image/half mode

Whole image is captured by half line

IV-S51M + High-speed camera

8.3ms



#### Partial image/full mode

Only the necessary part of the image is captured by full line

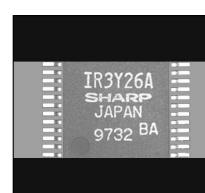
IV-S51M + Standard camera

16.7 ms

IV-S51M + High-speed camera

8.3ms

(Notice)



#### Partial image/half mode

Only the necessary part of the image is captured by half line

IV-S51M + High-speed camera

4.2 ms

(Notice)

\* Partial image is captured when 240 lines out of 480 lines are read.

\* Standard cameras: IV-S30C1/IV-S30C2, high speed camera: IV-S30C3/IV-S30C4

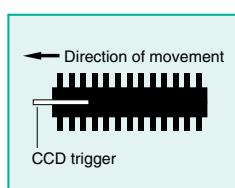
\* Full mode: odd/even lines are read, half mode: only odd lines are read.

(Notice) Image-capture time will differ depending on the position of partial image

(max. 0.4ms in the case above)

### CCD trigger function requires no external sensor

With window for trigger set up, no need for any external sensor even for moving measurement. You can select your trigger detection method from binary processing, average light level and gray search. Gray search can be used for the workpieces for which setting of the light range is tricky.



**High speed network that allows measured data and NG images to be sent to upward personal computer**

## Equipped with Ethernet interface

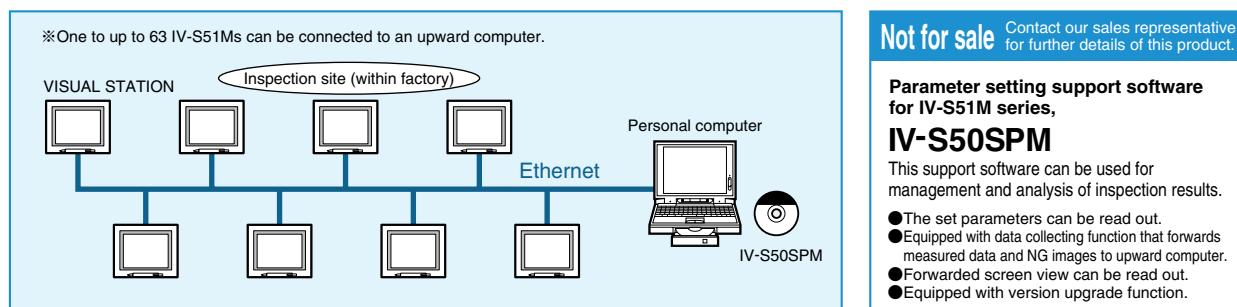
VISUAL STATION is equipped with Ethernet interface that allows fast communication to upward personal computer. You can see measured data and NG images at a personal computer which is located away from the inspection site. Parameter setting support software (IV-S51SPM) can be installed at a personal computer.

It used to be...

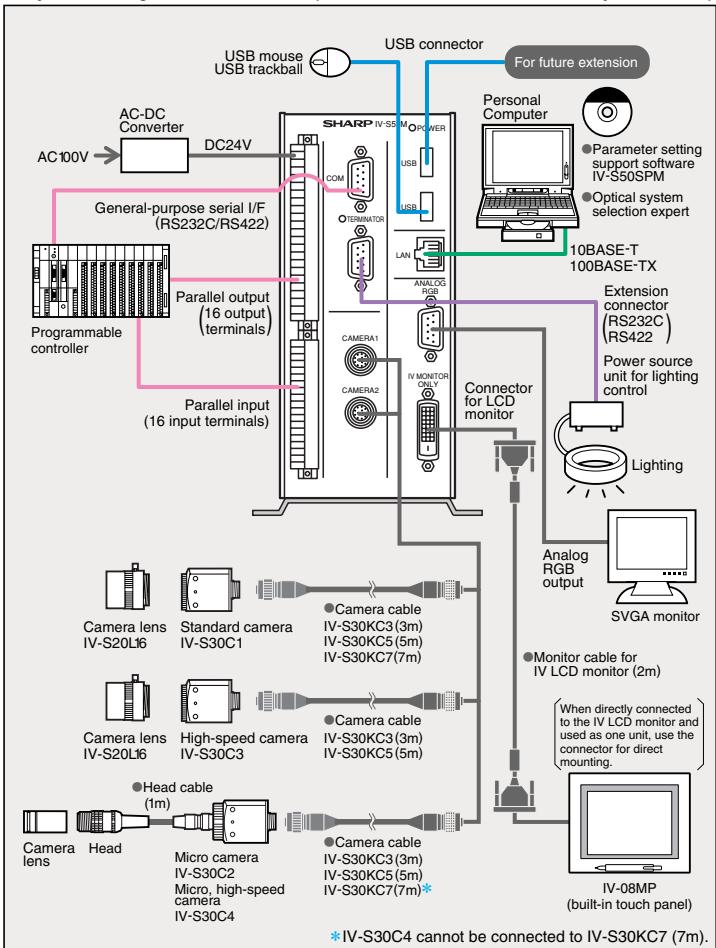
- Time consuming to confirm the inspection status and conduct defect analysis, making it so difficult to provide the prompt feedback.

With our VISUAL STATION...

- Measured data and NG images from multiple IV-S51Ms can be immediately sent to upward computer to reduce the number of NG products.



#### ■System configuration of IV-S51M (When an IV monitor is not directly connected)



## ■IV-S51M Product line

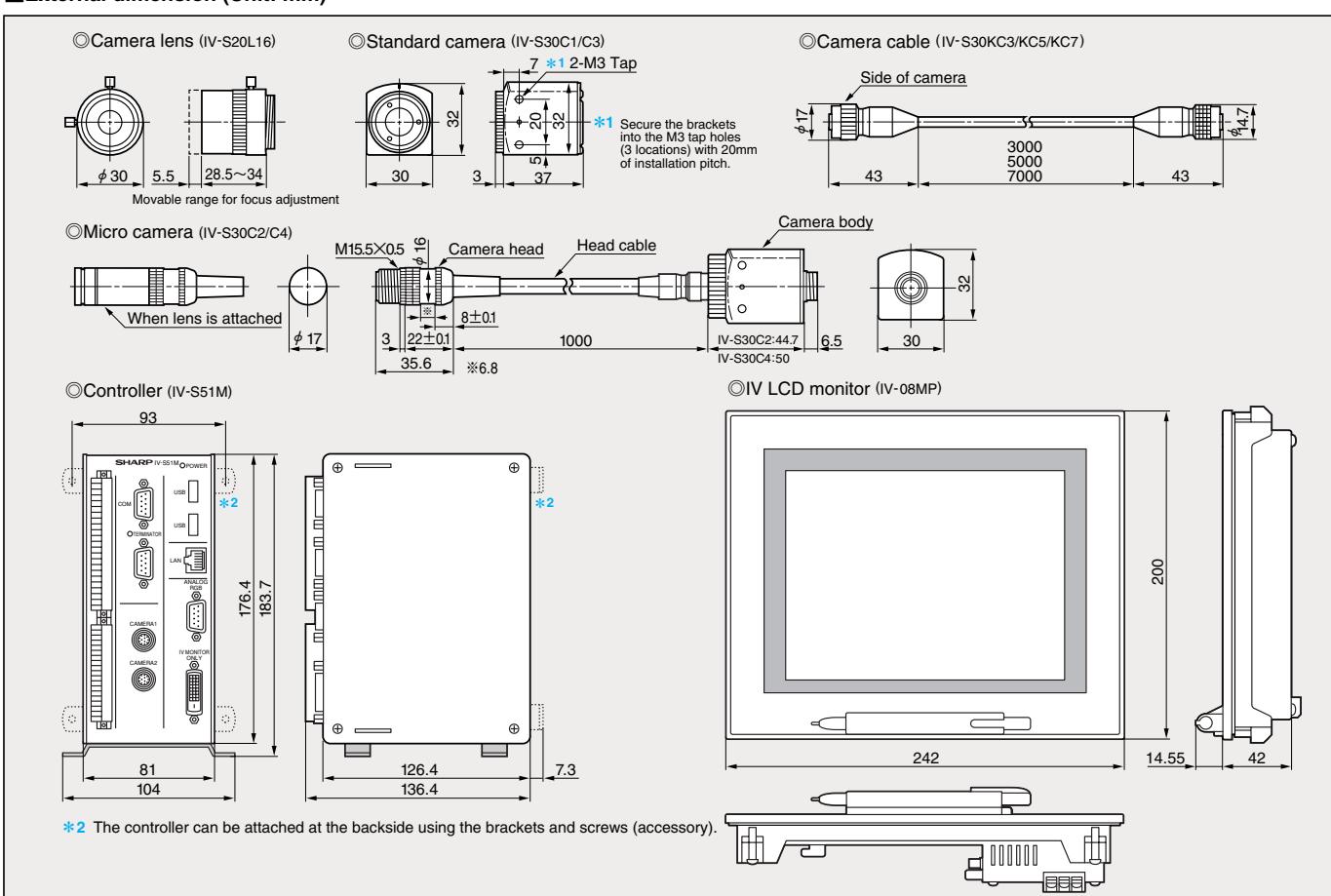
Item name	Model name	Specification or details
Controller	IV-S51M	Monochrome 256 gray level, 64 object types, Image processing procedure automatic generating expert function (binary processing), hidden workpiece search by new algorism (S search)
Camera	Standard	IV-S30C1 C mount
	Micro	φ17 mm mount
	High speed	IV-S30C3 C mount, 2X, 4X
	Micro, high speed	IV-S30C4 φ17 mm mount, 2X, 4X
Camera lens	IV-S20L16	C mount lens with a 16 mm focal length
Camera cable	IV-S30KC3	Cable for IV-S30C3/C1 camera, 3 m
	IV-S30KC5	Cable for IV-S30C3/C1 camera, 5 m
	IV-S30KC7	Cable for IV-S30C1 camera, 7 m
IV LCD monitor	IV-08MP	8.4 TFT color LCD with a built-in I/F touch panel (with stylus pen) for SVGA. The monitor can be directly mounted to IV-S51M. Screen image of display has 65,000 colors.
IV LCD monitor cable	IV-S50MC2	Cable for IV LCD monitor (IV-08MP), 2m
Parameter setting support software (not for sale)	IV-S50SPM	Control/analysis of inspection data can be set up on the Windows' screen (runs on Windows2000/XP/98).
Optical system selection expert (not for sale)	—	Enter the inspection, purpose, viewing field, and distance, then the recommended optical system type will be displayed.

◎Mixed use of high-speed type and standard type is not supported.

**VISUAL STATION** offers the various installation options to suit your installed location and environment. The monitor and the controller can be connected directly or with monitor cable, and the connector can be placed either vertically or horizontally. (Use the accessories angle brackets for vertical/horizontal placement.)



#### ■ External dimension (Unit: mm)



## ■ Specifications of IV-S51M controller

Image sampling system	Monochrome 256 gray level	Optical system maintenance	Lighting adjustment	Adjustment of light volume
Image memory	One screen for one captured image per camera		Light level automatic adjustment	Monitoring illuminance → shading diagnosis → optical system automatic adjustment (1. light volume, 2. shutter speed)
No. of assignable object type	64 object types			
No. of camera to be connected	Up to 2 cameras			
Image processing	Gray, binary conversion			Displaying measuring time, monitoring illuminance, switching language between Japanese and English, running screen lock function, and change image display (through/freeze)
Image capture time	Standard camera: 33.3 ms High speed camera: 16.7 ms (full mode), 8.3 ms (half mode)			
Gray search time	8ms (model: 64×64, search area: 256×256, when the speed is prioritized)			
Rotation correction time	142 ms (conditions: 360°, freeze, priority on speed, size 128×64, search area 512×480)			
Gray search, edge detection precision	Sub-pixel			
Gray image pre-processing	Gray level change: Histogram widening Noise elimination: Smoothing (average/ center) Outline extraction: Edge extraction (primary differentiation, secondary differentiation), horizontal edge, vertical edge Binary threshold value: Fixed and threshold value correction (variation difference/variation rate) Expansion, contraction, and area filter: Expansion → contraction → expansion → contraction, space filter			Object: position detection, position & attitude angle, size inspection, workpiece count inspection, distance & angle measurement, workpiece dimension measurement, and defect inspection
Positional correction method	X/Y correction, rotation correction			
Window shape	Rectangle, circle, oval, polygon, and free shape			
Position detection	Object: 1. single workpiece, 2. multiple work pieces can be processed simultaneously Output: coordinate			
Position & attitude angle	Object: 1. single workpiece, 2. multiple workpieces can be processed simultaneously Output: coordinate, angle			
Shape degree of match inspection	Object: 1. single workpiece, 2. multiple workpieces can be processed simultaneously Output: Degree of match			
Point sensor	Output: yes or no			
Existence of work and size inspection	Measurement: 1. no individual workpiece, 2. individual workpiece Output: area			
Workpiece counting	Object: 1. all the workpieces, 2. designated workpieces Output: number of object detected			
No. of projected parts and alignment	The number of projected parts, interval, width (point alignment)			
Distance & angle measurement	Object: 1. single workpiece, 2. multiple workpieces can be processed simultaneously Output: distance (between 2 points/X coordinate/Y coordinate), angle (3 points/2 points against vertical line/2 points against horizontal line)			
Workpiece dimension measurement	Output: number of workpiece, total area, area for each label, diameter of the projection width, circumference length, main axes angle			
Number of measurement program	Maximum 8 measurements/type (measurement item 0 - camera 1, measurement item 0 - camera 2, and measurement item 1 ~ 6)			
Arithmetic operation	Four basic operations (+, -, ×, ÷), root, absolute value, TAN, ATAN, maximum, minimum, average, and total			
NG image memory function	Maximum 128 images (8 whole scenes)			
Calendar/timer	Year, month, day, hour, minute and second			
Optical system configuration setting	Image adjustment 1: 1. Focus adjustment, 2. contrast adjustment Image adjustment 2: 1. Image distortion diagnosis & compensation, 2. calibration			

## ■ Specifications of camera

	Standard IV-S30C1	High speed IV-S30C3	Micro IV-S30C2	Micro, high speed IV-S30C4
Optical system	Lens mount method	C mount	Φ17 mm mount	
	Method	Interline transmission method, monochrome CCD		
	Reading system	Full pixel type, partial image scanning is available.		
Picture taking element	Reading Standard time	33.3 ms *1		
	High speed	16.7 ms (full mode), 8.3 ms (half mode) *1		
	Size	1/3 inch		
	No. of effective pixels	52 (horizontal) × 480 (vertical)		
	Pixel shape	Tetragonal lattice		
Shutter	Shutter speed	Settable between 1/30 ~ 1/10,000 sec. (for each object type)		
	Method	Random shutter		
	Connector	Round, 12-pin, male connector		
	Connection to controller	Connection using custom camera cables (IV-S30KC3: 3m, IV-S30KC5: 5m, and IV-S30KC7 *2: 7m)		
	Operation ambient temperature/humidity/atmosphere	0 ~ 45 °C / 35 ~ 85% (non-condensing), free from corrosive gases or dust		
External dimensions	Camera body section	30 (W) × 32 (H) × 40 mm(D)	IV-S30C2: 30 (W) × 32 (H) × 50mm(D) IV-S30C4: 30 (W) × 32 (H) × 44.7mm (D)	
	Head section	—	Φ17 mm × 35.6mm	
	Head cable	—	1 m	
	Weight	50 g (not including the lens)	IV-S30C2: approx. 125 g (approx. 12g for head section) IV-S30C4: approx. 140 g (approx. 13g for head section)	

## ■ Specifications of camera lens (IV-S20L16)

Focal distance	16 mm
Maximum f-stop	1.6
Aperture range	1.6 ~ 16 close
Focal range	50 mm ~ ∞
Filter installation diameter	M25.5, P = 0.75, U1
Mount system	C mount
Compatible cameras	IV-S30C1/C3

\*1 Variable by reading partial image.

\*2 IV-S30C3/C4 can not be connected to IV-S30KC7(7m).

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### To use this device effectively and safely!

- Make sure to read the instruction manual before use. Make sure to supply the specified power and voltage.

## SHARP MANUFACTURING SYSTEMS CORPORATION

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The details in this pamphlet were correct as of April 2004.

● Information about SHARP control equipments is available at our web site <http://sharp-world.com/sms/>